United States Patent [19]

Ogarek et al.

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[45] **Feb. 1, 1983**

[54] **SECONDARY SEAL FOR FLOATING ROOF STORAGE TANK**

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[73] Assignee: **GATX Tank Erection Corporation**, Chicago, Ill.

[21] Appl. No.: **203,795**

[22] Filed: **Nov. 3, 1980**

[51] **Int. Cl.**[3] **B65D 88/46**

[52] **U.S. Cl.** **220/224**; 220/222

[58] **Field of Search** ..... 220/216–227, 220/89 B; 361/215

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Primary Examiner—William Price
Assistant Examiner—Gary E. Elkins
Attorney, Agent, or Firm—Dithmar, Stotland, Stratman & Levy

[57] **ABSTRACT**

A floating roof storage tank having an upstanding tank shell for containing liquid to be stored and having therein a floating roof floating on the surface of the stored liquid, a primary seal interconnecting the floating roof and the tank shell, and an annular secondary seal extending between the floating roof and the tank shell providing a gas tight seal and weather shield for the primary seal, sealant is used at the inner end of the secondary seal mounted to the floating tank to ensure the gas tight connection thereat, and a tapered and rounded flexible free or outer end of the secondary seal ensures that irregularities in the tank shell do not permit vapors to escape; support structures maintain the secondary seal in its desired configuration and a variety of structures are disclosed for maintaining adjacent arcuate sections of the secondary seal in fixed and sealed relation.

7 Claims, 14 Drawing Figures

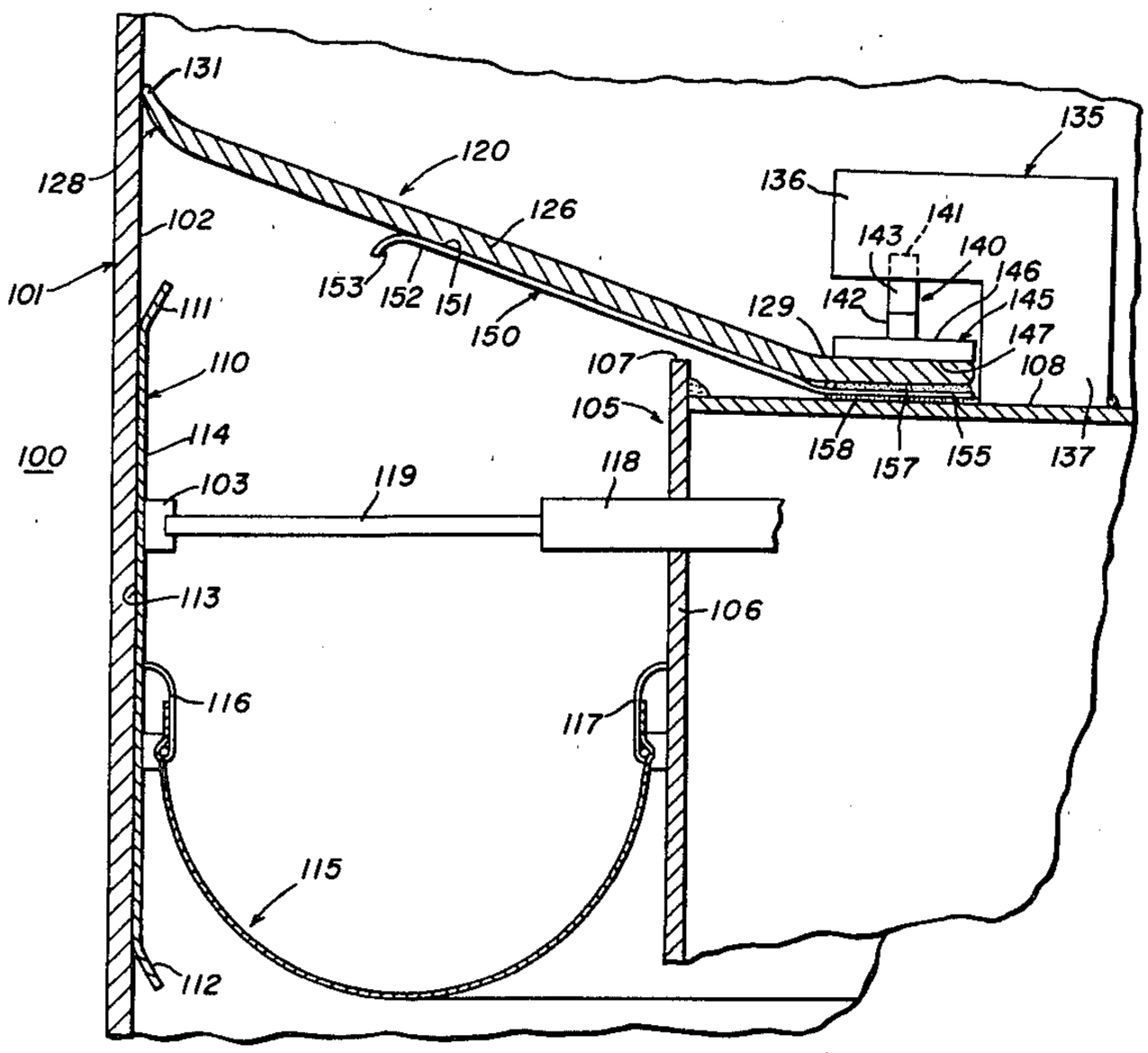

FIG. 1

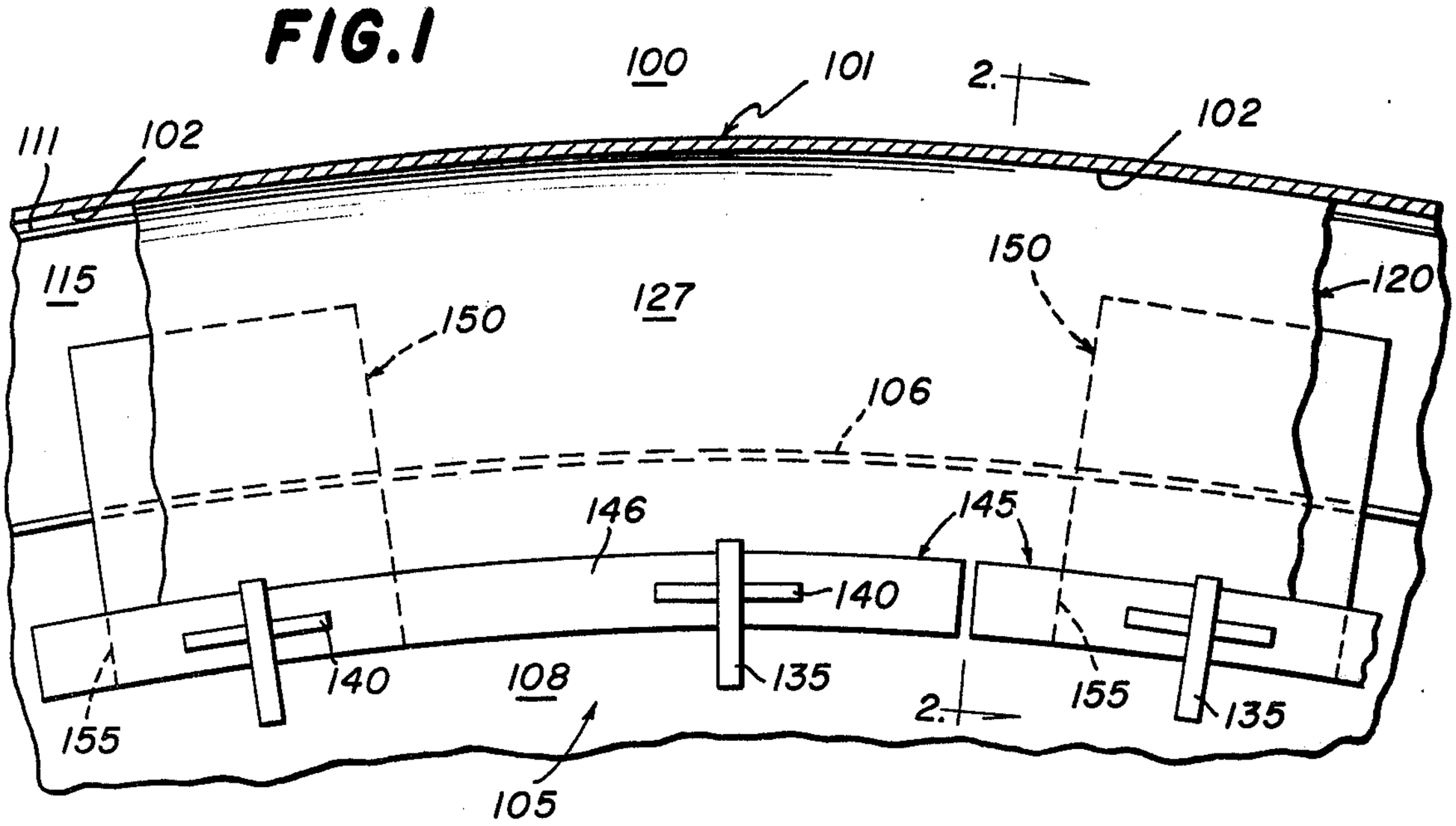
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FIG. 2

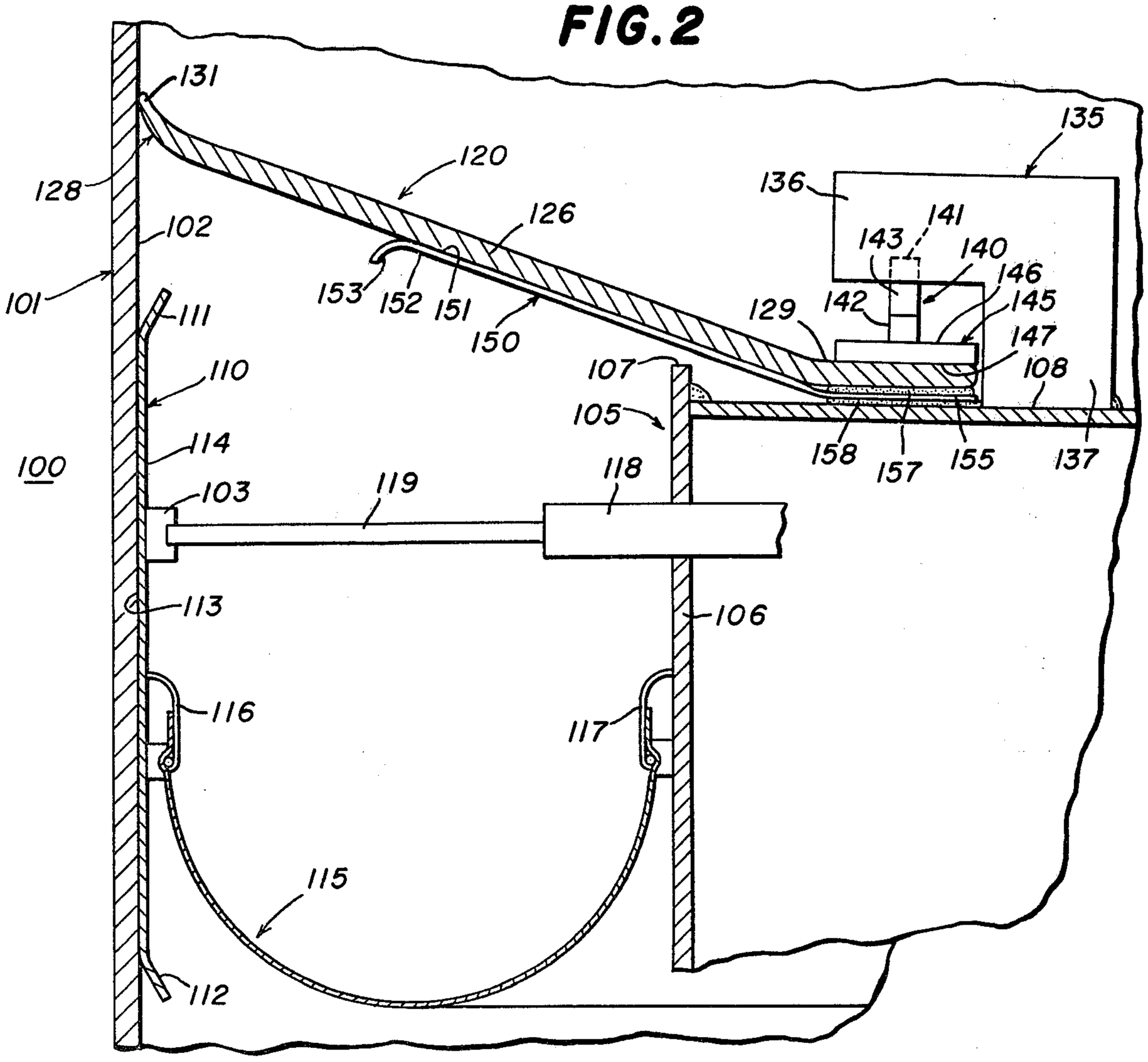
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FIG. 3

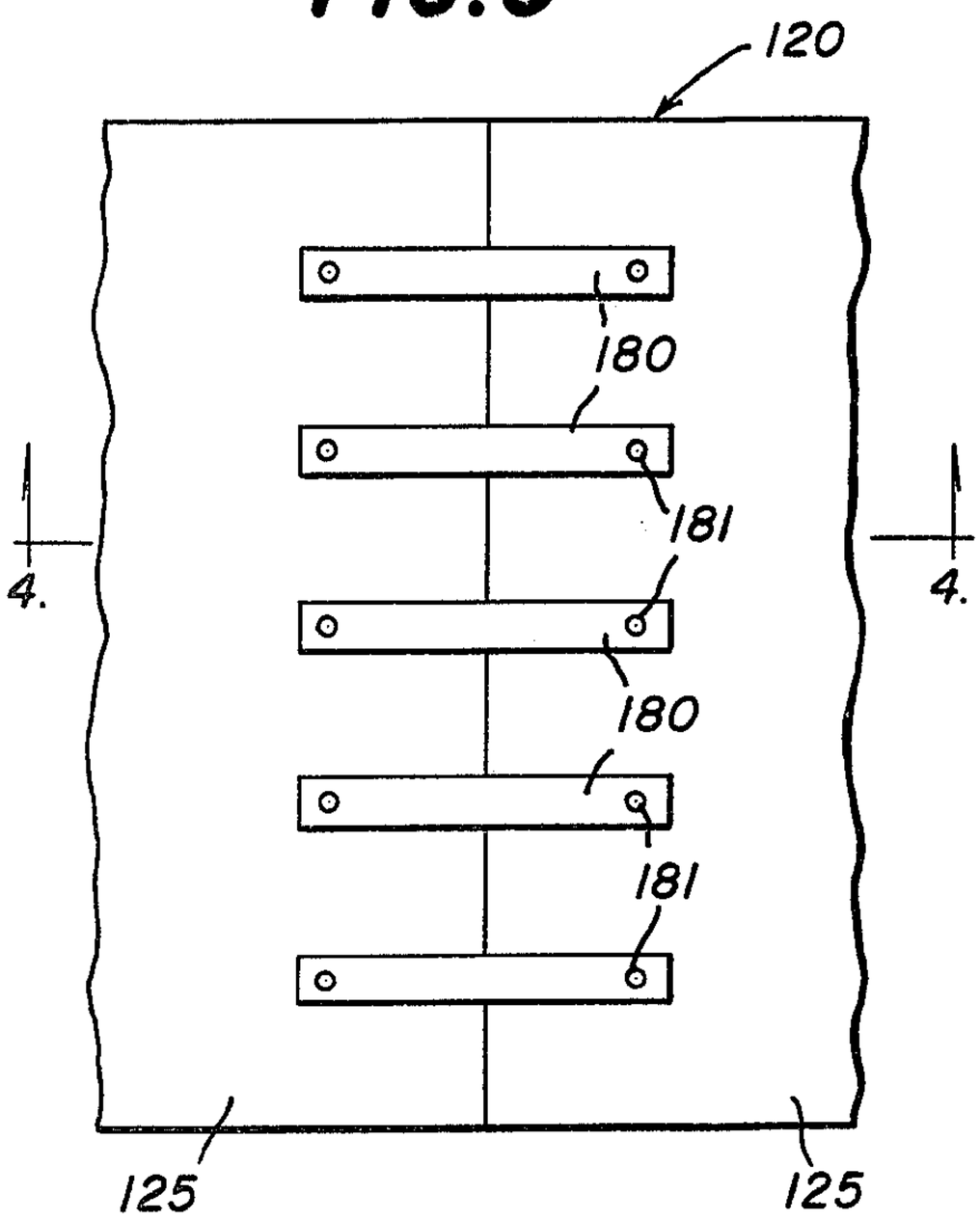


FIG. 4

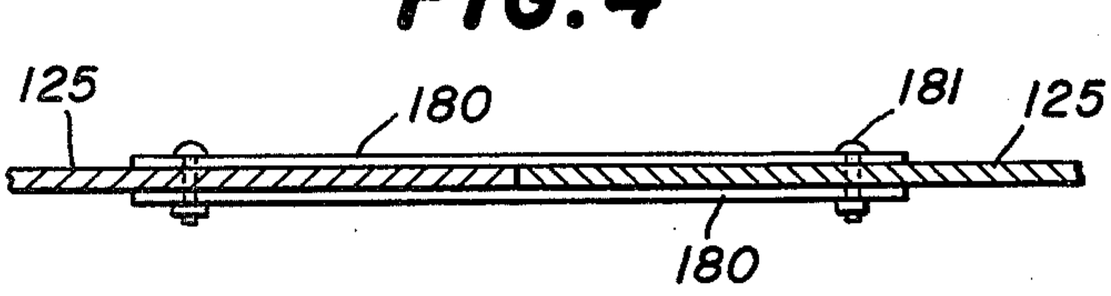


FIG. 5

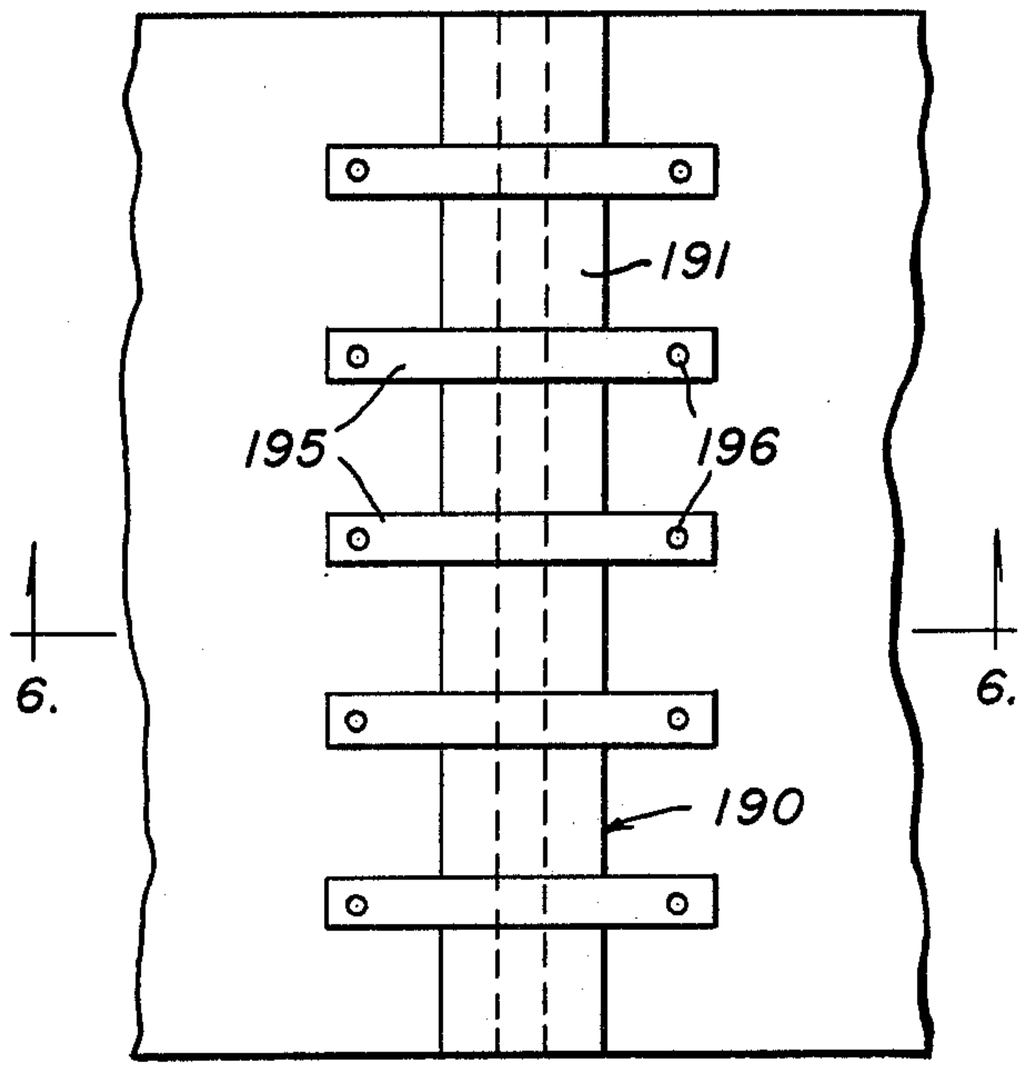


FIG. 6

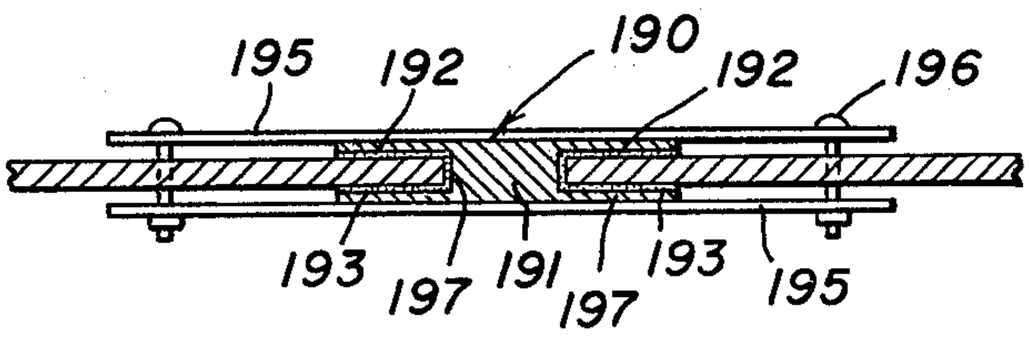
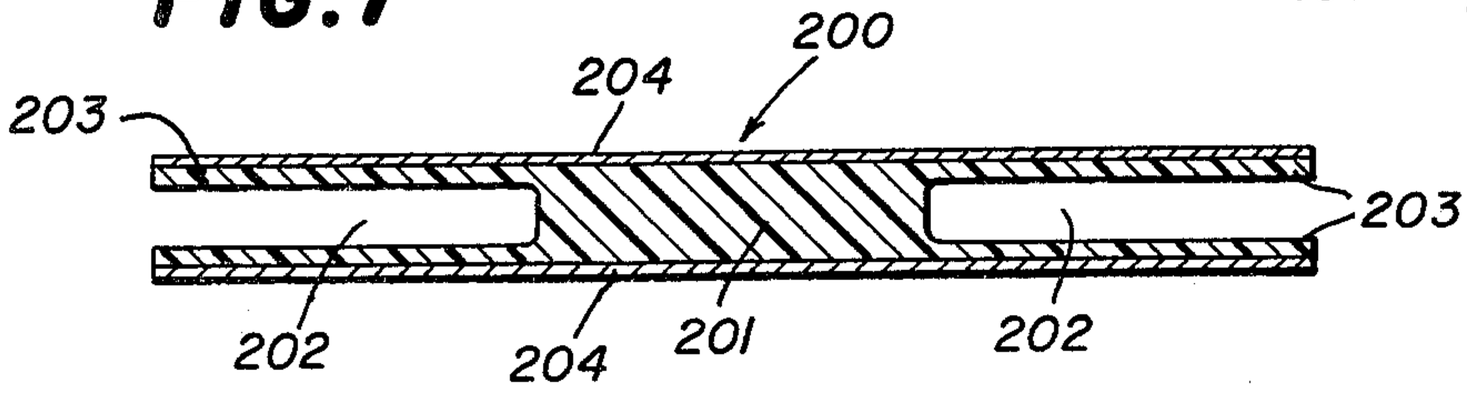


FIG. 7



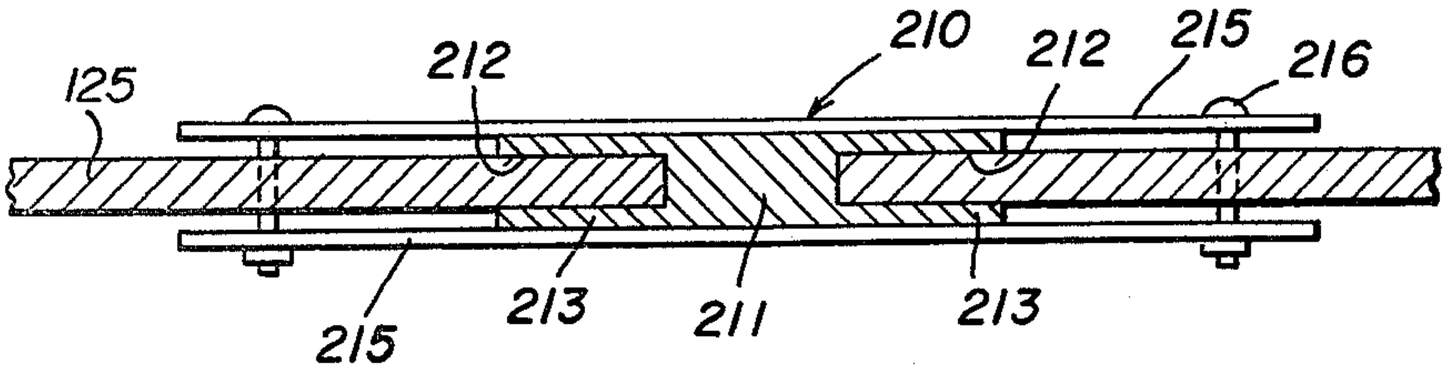


FIG. 8

FIG. 9

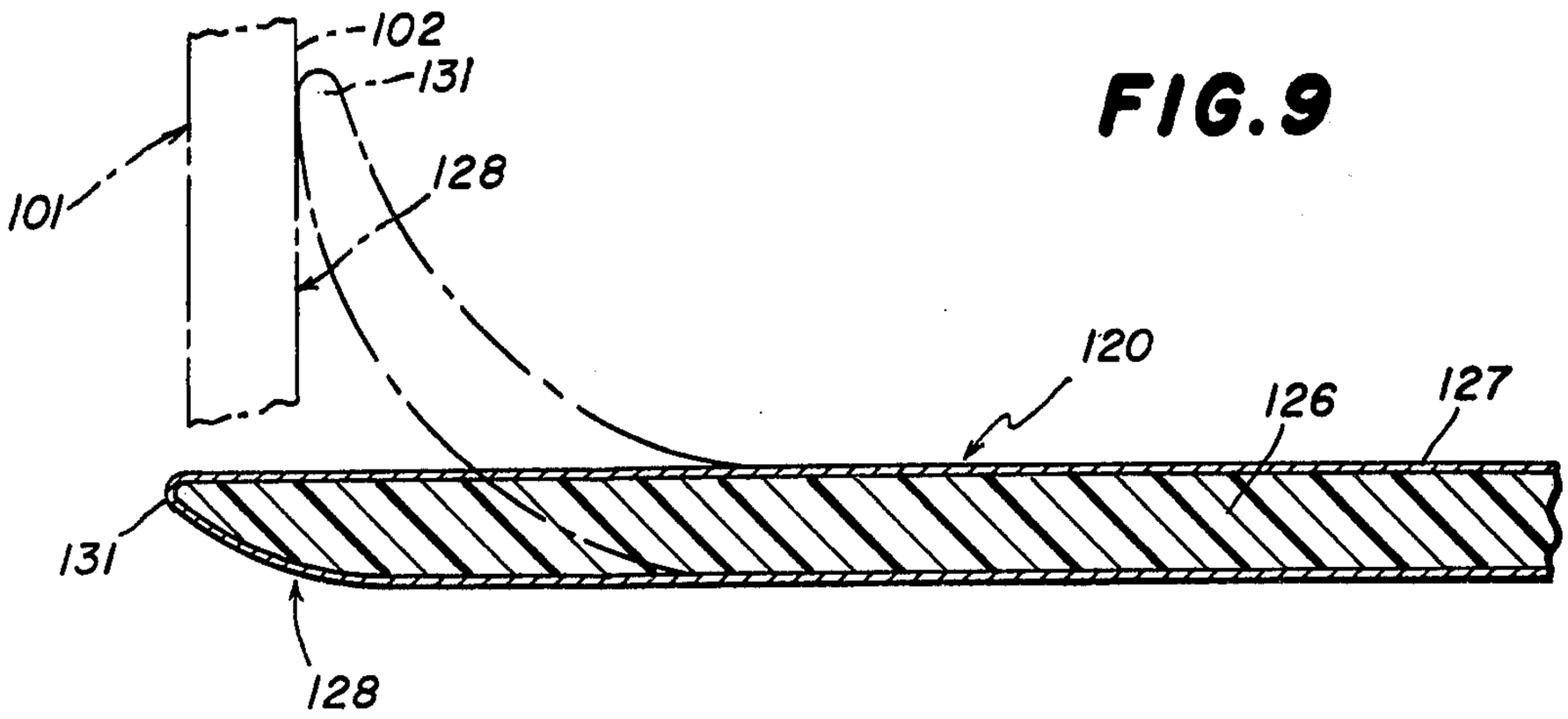


FIG. 10

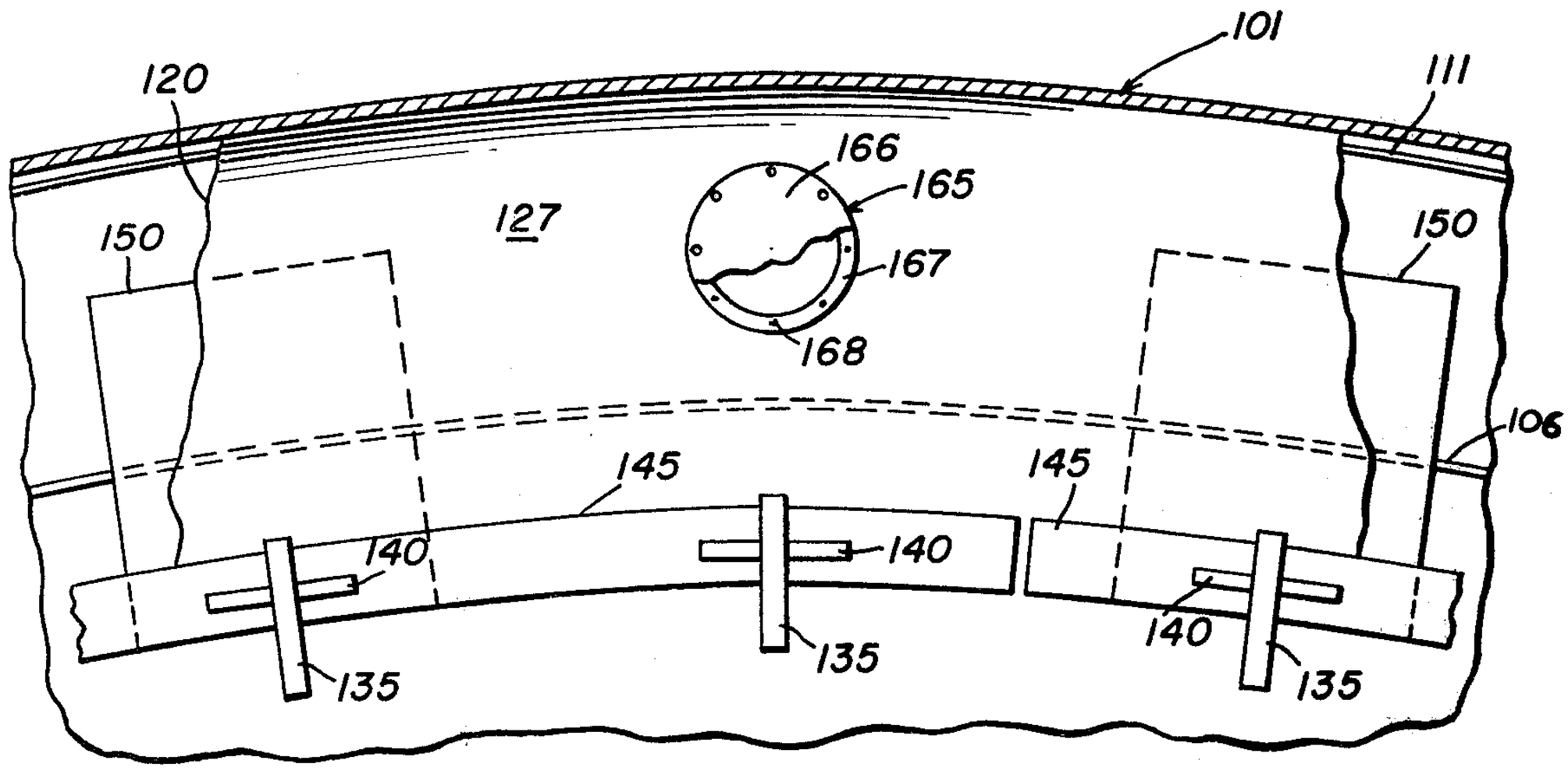


FIG. 11

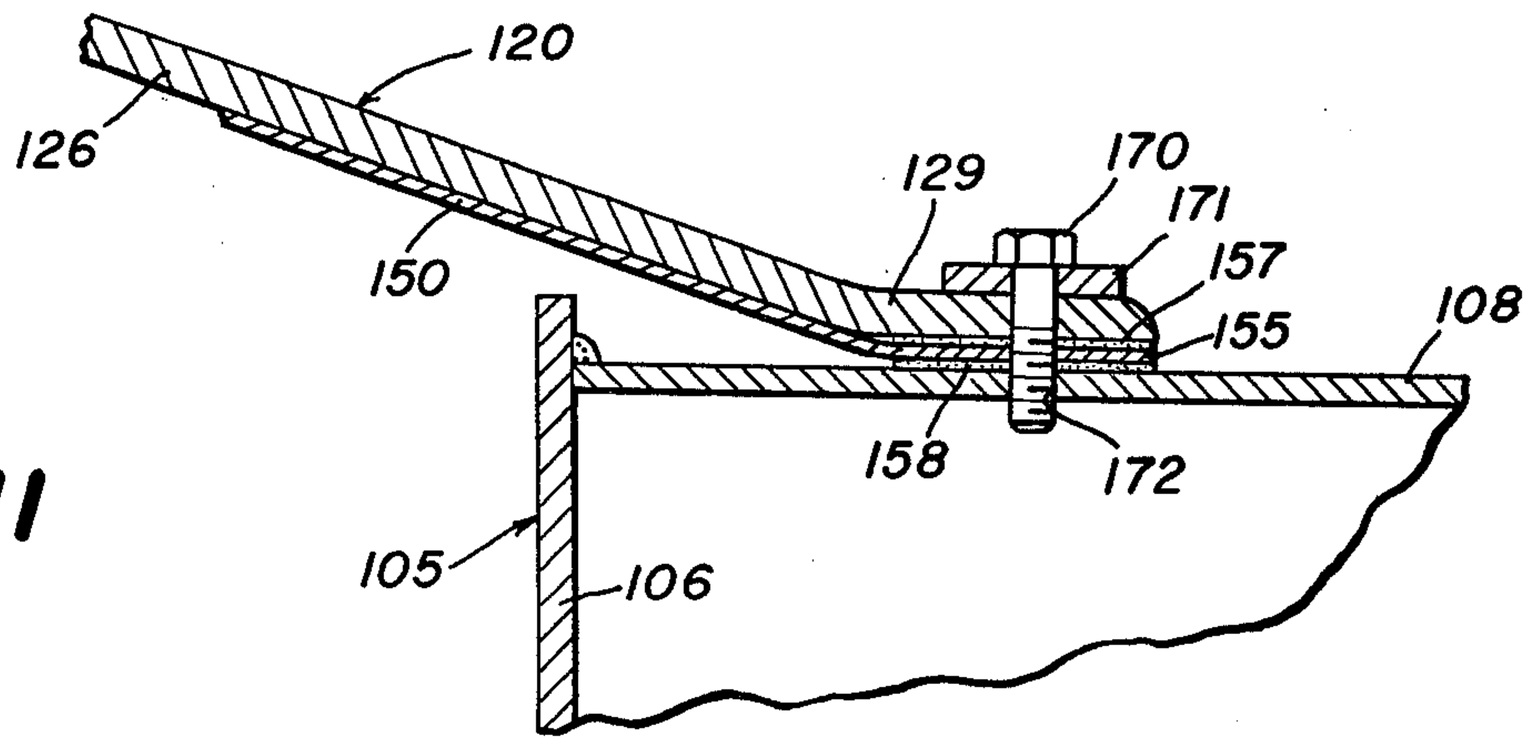


FIG. 12

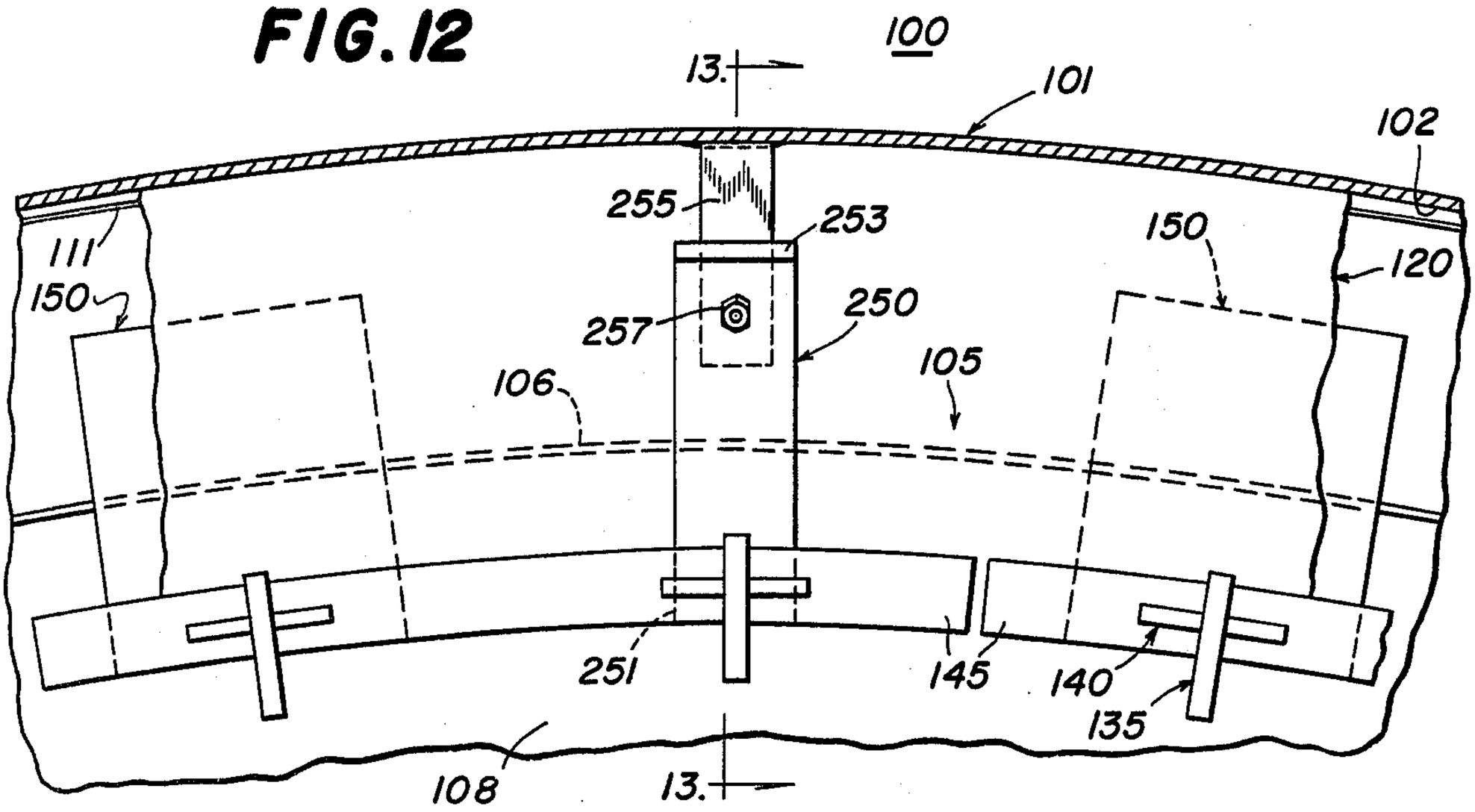


FIG. 13

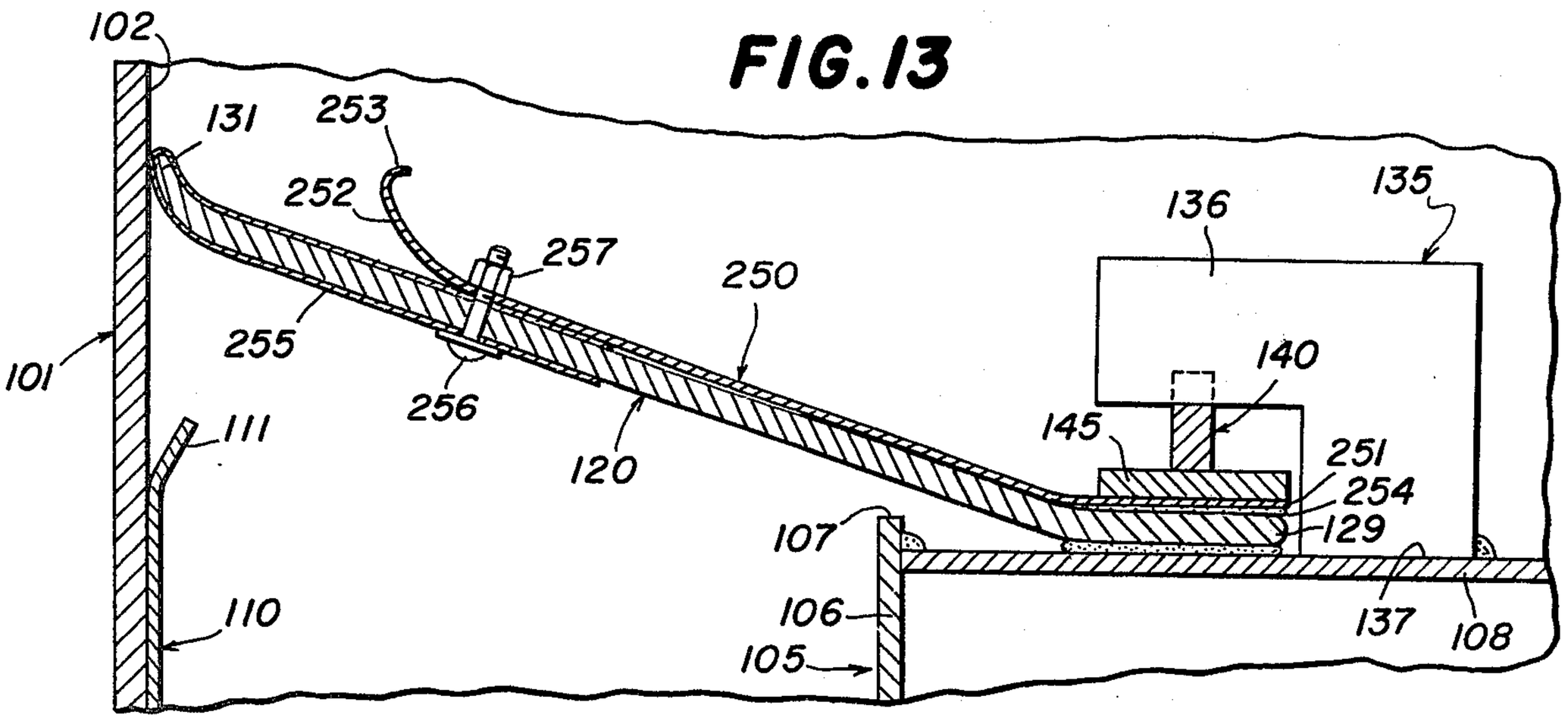
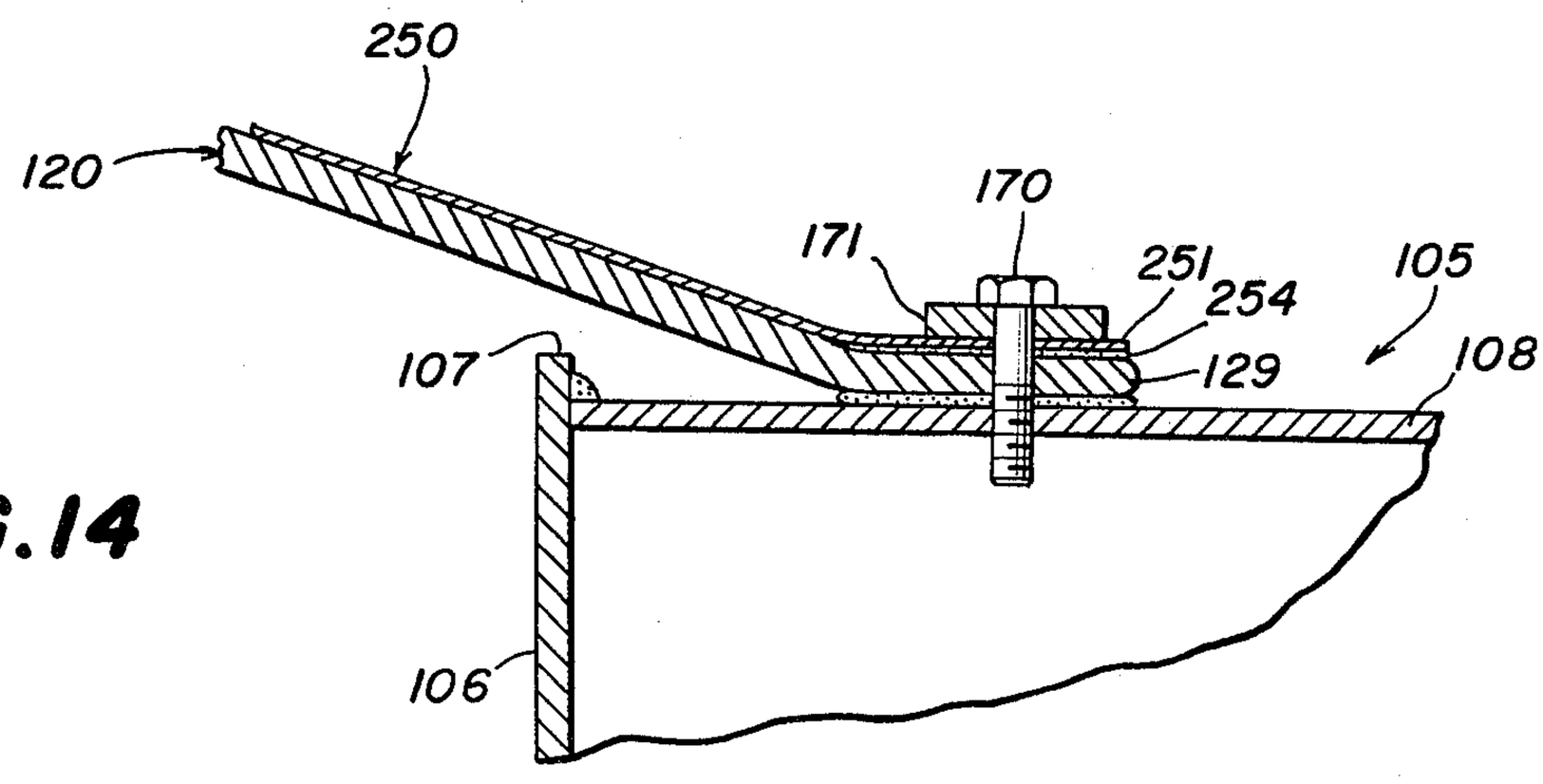


FIG. 14



SECONDARY SEAL FOR FLOATING ROOF STORAGE TANK

BACKGROUND OF THE INVENTION

The present invention relates to improvements in secondary seals for a floating roof storage tank, and specifically to the provision of a secondary seal that provides a gas tight additional seal between the tank shell and the floating roof rim.

Current air quality control regulations require that floating roof storage tanks be provided with both a primary seal and a secondary seal to control the emission of volatile components and fumes from liquid stored within the floating roof storage tank. The primary seal closes the opening between the floating roof rim and either the tank shell or a metal shoe sliding on the inner surface of the tank shell. The secondary seal closes the space between the tank shell and the floating roof rim above the primary seal. Examples of floating roof storage tanks in which the secondary seal of the present invention is useful are illustrated in U.S. Pat. No. 2,754,026 granted July 10, 1956 to J. H. Wiggins, U.S. Pat. No. 2,802,591 granted Aug. 13, 1957 to J. H. Wiggins, U.S. Pat. No. 3,043,468, issued July 10, 1962 to F. W. Horner, Jr. and U.S. Pat. No. 3,307,733, granted Mar. 7, 1967 to W. L. De Bock.

Secondary seals for floating roof storage tanks have been provided heretofore, and exemplars thereof are illustrated in U.S. Pat. No. 2,427,171 granted Sept. 9, 1947, to J. H. Wiggins and U.S. Pat. No. 4,154,359 granted May 15, 1979 to B. E. Bissett. The secondary seals illustrated in the foregoing patents do not teach gas tight connections to the floating roof and, indeed, the secondary seal of U.S. Pat. No. 2,427,171 is not even connected to the floating roof. While the secondary seal of the Bissett patent does close the space between the floating roof and the tank shell, it is inadequately supported and it makes no provision for access to the annular space between the primary and secondary seals. Furthermore, the upper edge of the Bissett secondary seal is susceptible to snagging on surface irregularities on the inside of the tank shell.

BRIEF SUMMARY OF THE INVENTION

The present invention provides a secondary seal for floating roof storage tanks which is gas tight with respect to the primary seal, and therefore, provides a separate and independent seal between the tank shell and the rim of the floating roof, functioning as both a vapor seal and a weather shield for the primary seal.

The secondary seal of the present invention is also constructed and arranged so as to provide access to the annular space between the primary and secondary seals for introduction of fire-extinguishing materials and the like.

In addition, the secondary seal, which may be constructed of plural sections for easy fabrication, is provided with gas tight means for joining adjacent sections.

Furthermore, the secondary seal is provided with support means for preventing sagging while holding the seal firmly against the tank shell.

These and other features are achieved in the present invention, and it is an object of the present invention to accomplish these desired results, by providing a floating roof storage tank comprising an upstanding cylindrical tank shell for containing a quantity of liquid to be stored, a floating roof within the tank shell adapted to float on the surface of the liquid within the tank shell, first sealing means extending between the floating roof and the tank shell and closing the space therebetween to provide a primary seal therebetween, a second sealing member secured to the floating roof and extending therebeyond and lying in sealing engagement with the inner surface of the tank shell to form a secondary seal between the floating roof and the tank shell, and a sealant providing a gas tight seal between the second sealing member and the floating roof.

Another object of the invention is to provide a floating roof storage tank of the type set forth wherein clamp means on the floating roof circumferentially spaced therearound secures the second sealing member to the floating roof, the clamp means including removable wedges for wedging the second sealing member toward the floating roof, and sealing means between the floating roof and the second sealing member providing a gas tight seal therebetween.

Yet another object of the invention is to provide a floating roof storage tank of the type set forth wherein the free end of the second sealing member is tapered and rounded to provide an enlarged bearing surface and to accommodate irregularities on the tank shell, the length of the second sealing member being sufficient to ensure the tapered and rounded end thereof being in contact with the inner surface of the tank shell to provide substantially a gas tight fit therebetween, and sealing means providing a gas tight seal between the second sealing member and the floating roof.

Still another object of the invention is to provide a floating roof storage tank of the type set forth wherein the sealing member is formed of plural sections, with gas tight means for joining adjacent sections to form an annular secondary seal between the floating roof and the tank shell.

A further object of the invention is to provide a floating roof storage tank comprising an upstanding cylindrical tank shell for containing a quantity of liquid to be stored, a floating roof within the tank shell adapted to float on the surface of the liquid within the tank shell, first sealing means extending between the floating roof and the tank shell and closing the space therebetween to provide a primary seal therebetween, a second sealing member secured to the floating roof and extending therebeyond and lying in sealing engagement with the inner surface of the tank shell to form a secondary seal between the floating roof and the tank shell, fusible means in the second sealing member permitting entry into the annular space between the primary seal and the secondary seal, and sealing means providing a gas tight seal between the second sealing member and the floating roof.

Further features of the invention pertain to the particular arrangement of the parts of the secondary seal for the floating roof storage tank, whereby the above outlined and additional operating features thereof are attained.

The invention, both as to its organization and method of operation, together with further features and advantages thereof will best be understood with reference to the following specification taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a fragmentary view in horizontal section of the tank shell illustrating a portion of the floating roof

and incorporating therein a secondary seal made in accordance with and embodying the principles of the present invention;

FIG. **2** is a fragmentary view in vertical section showing the construction of the primary seal and the secondary seal along the line **2—2** of FIG. **1**;

FIG. **3** is a fragmentary plan view showing sealing structure for joining adjacent sections of the secondary seal;

FIG. **4** is a view in section of the sealing structure of FIG. **3** along line **4—4** thereof;

FIG. **5** is a fragmentary plan view of another embodiment of the sealing structure for joining adjacent sections of the secondary seal;

FIG. **6** is a view in section of the sealing structure of FIG. **5** along line **6—6** thereof;

FIG. **7** is a view in section of another embodiment of a fixture for joining adjacent sections of the secondary seal;

FIG. **8** is a view in section of another embodiment of a fixture for joining adjacent sections of the secondary seal;

FIG. **9** is a sectional view of the tapered and rounded free end of the secondary seal;

FIG. **10** is a view like FIG. **1** showing a fusible member in the secondary seal;

FIG. **11** is a view of another embodiment of means securing the secondary seal to the floating roof storage tank;

FIG. **12** is a view similar to FIG. **1**, and illustrating another embodiment of the present invention which includes external support springs for the secondary seal;

FIG. **13** is an enlarged fragmentary view in vertical section taken along the line **13—13** in FIG. **12**; and

FIG. **14** is a fragmentary sectional view similar to FIG. **11** illustrating an alternate means of securing the external support springs to the floating roof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. **1**, **2** and **9** of the drawings, there is illustrated a floating roof storage tank **100** incorporating therein a primary seal **115** and a secondary seal **120**, the secondary seal being made in accordance with and embodying the principles of the present invention.

The floating roof storage tank **100** includes the usual upright cylindrical tank shell **101** that is circular in horizontal cross section and has an inner surface **102** against which the liquid stored is in contact. Such storage tanks are widely used to hold petroleum and petroleum products, such as gasoline, as well as other volatile liquids. Disposed within the tank shell **101** and spaced radially inwardly from the inner surface **102** thereof and adapted to float on the surface of the liquid within the tank shell **101** is a floating roof or pontoon **105**. The floating roof **105** is a hollow structure having an outer wall or rim **106** with an upper edge **107**, the wall **106** being circular in horizontal section and being spaced away from the tank shell **101**.

The bottom of the outer wall **106** is closed by a bottom wall (not shown) and a top wall or cover plate **108** closes the top of the outer wall **106**. The tank shell **101** and the floating roof **105** are normally made of metal, such as steel.

The primary sealing system for the storage tank **100** may be a metal shoe-type, as exemplified by the Wiggins U.S. Pat. No. 2,802,591, or a soft, toroidal, filled-envelope-type, as disclosed in the DeBock U.S. Pat. No. 3,307,733. For purposes of illustration, only the metal shoe-type is depicted in the drawings. More particularly, a metal shoe **110** is disposed within the tank shell **101** and slidably engages the inner surface **102** of the tank shell **101**. The upper edge of the metal shoe **110** has an inwardly and upwardly directed upper flange **111** extending therearound, and the lower edge of the metal shoe **110** has an inwardly and downwardly directed lower flange **112** extending therearound. The metal shoe **110** has an outer surface **113** that bears against the inner surface **102** of the tank shell **101**, and also has an inner surface **114**.

The primary seal **115** is provided between the floating roof **105** and the metal shoe **110** in the form of a flexible sealing member which has the outer edge thereof secured by clamps **116** to the inner surface **114** of the metal shoe **110** and has the inner edge thereof secured by clamps **117** to the outer surface of the floating roof wall **106**. The metal shoe **110** is carried by and moves upwardly and downwardly with the floating roof **105**, pusher structures (one shown) being provided interconnecting the floating roof **105** and the metal shoe **110** and including a piston cylinder **118** mounted on the floating roof **105** and a piston rod **119** extending therefrom and secured by a bracket **103** to the inner surface **114** of the metal shoe **110**. Details of the construction and operation of the pusher structures are set forth in U.S. Pat. No. 2,802,591 referred to above.

Referring also to FIGS. **3** and **4** of the drawings, the secondary seal **120** comprises an annular flexible sheet which may be formed of a plurality of discrete sections **125**. Each of the sections **125** of the secondary seal **120** includes an elastomeric body portion **126** encapsulated in a synthetic organic resin cloth outer covering **127** and has a free or outer end **128** which is tapered as at **131** with a rounded end to provide a flexible wiper for contacting the adjacent surface **102** of the tank shell **101**, thereby providing a weather shield (see FIG. **9**). The inner or attachment end **129** of each of the sections **125** is maintained in fixed relation to cover plate **108** of the floating roof or pontoon **105** by means of a plurality of circumferentially spaced clamp lugs **135**, each of the clamp lugs **135** having a horizontal portion **136** and a vertical or support portion **137**. There is also provided retaining means including a plurality of wedges **140**, each associated with a corresponding one of the clamp lugs **135**, each wedge **140** having a larger end **141**, a smaller end **142** and a ramp surface **143** interconnecting the two ends.

An arcuate clamp bar **145** or pressure transmitting member is associated with at least two adjacent clamp lugs **135**, the clamp bar **145** having sufficient arcuate extent to extend beyond two adjacent clamp lugs **135** and to transmit sealing pressure from the lugs due to the wedges **140** to the portion of the seal **120** adjacent thereto. Each of the arcuate clamp bars **145** has an upper surface **146** contacted by the associated wedge **140** and a lower surface **147** in contact with the attachment or inner end **129** of the associated section **125** of the secondary seal **120**, thereby to maintain each section **125** in place and connected to the floating roof or pontoon **105**. An advantage of the clamp lugs **135**, the wedges **140** and the clamp bar **145** is that no openings are required to be made through the sections **125**.

A plurality of anti-sag supports **150** are circumferentially spaced around the floating roof **105** and serve to support each of the sections **125** forming the secondary seal **120**, each of the anti-sag supports **150** having an

upper surface **151** in contact with the associated section **125** and a lower surface **152**. Each anti-sag support **150** has at the outer or free end thereof a downturned flange **153** to prevent inadvertent sagging of the secondary seal **120** and an inner or clamping end thereof **155** which is fixedly maintained in place by means of the cooperation of the associated clamp lug **135** and wedge **140**. As illustrated in FIGS. **1** and **10** of the drawings, an anti-sag support **150** is associated with alternate ones of the clamp lugs **135**.

In order to provide a gas tight seal between the floating roof or pontoon **105** and the secondary seal **120**, it is necessary to insure the gas tight nature of the seal at each end thereof. To this end, there is provided sealant material **157** between the inner or attachment ends **155** of the associated anti-sag supports **150** and the attachment end **129** of the secondary seal **120**, and sealant material **158** is provided between the inner or attachment ends **155** of the anti-sag supports **150** and the associated cover plate **108** of the floating roof or pontoon **105**. The associated clamp lug **135** and wedge **140** maintain the secondary seal **120** as well as the anti-sag supports **150** in an upwardly and outwardly extending position illustrated in the drawings to maintain the gas tight nature of the secondary seal **120**. The sealant material **157** and **158**, as will be appreciated by those skilled in the art, may be made of any suitable air curing adhesive material which is substantially unaffected by the lading usually stored within the floating roof storage tank **100**.

Fusible members **165** (one shown, see FIG. **10**) are positioned at circumferentially spaced apart locations along the secondary seal **120** to permit ready access to the annular space between the secondary seal **120** and the primary seal **115** for introduction of fire-fighting foam or the like in the event of a rim fire. The fusible members **165** may be of any suitable low melting point synthetic organic resin such as a low melting point polyethylene, each of the fusible members being in the form of a disc **166** supported by a clamp ring **167** suitably connected to the associated secondary seal section **125** by a plurality of fasteners **168** circumferentially positioned around the ring **167**.

Referring now to FIG. **11** of the drawings, there is shown an alternate mechanism for attaching the secondary seal **120** to the associated floating roof or pontoon **105** and particularly the cover plate **108** thereof. A plurality of fasteners **170**, each having an expanded head or washer portion **171**, are circumferentially spaced about the inner or attachment ends **129** and **155**, respectively, of the secondary seal **120** and the associated anti-sag supports **150**. The presence of the sealant material **157** and **158** on both sides of the anti-sag supports **150**, where said supports are present along the circumferential extent of the secondary seal **120**, and the presence of multiple layers of sealant material where the anti-sag supports **150** are not present ensure a gas tight seal even though the fasteners **170** extend through the secondary seal **120** and the associated cover plate **108**.

Referring now to FIGS. **3–8** of the drawings, there are disclosed various mechanisms for maintaining the edges of adjacent sections **125** in sealing relation, thereby to form the secondary seal **120** and preserve the gas tight nature thereof. FIGS. **3** and **4** particularly show a plurality of radially spaced apart and circumferentially-extending strips **180** placed in registry on the upper and lower sides of adjacent sections **125** forming the secondary seal **120**, and spanning the junction therebetween. Each of the strips **180** is provided with fasteners **181** near the ends thereof, each fastener **181** extending through one of the adjacent sections **125**, thereby to maintain the adjacent sections **125** in fixed and abutting relation.

FIGS. **5** and **6** disclose a radially-extending fixture **190** which includes a body portion **191** which may be of the same elastomeric material as the body portion **126** of the secondary seal **120**, the fixture **190** including oppositely extending slots **192** formed by associated leg portions **193** extending outwardly from the body portion **191**, circumferentially of the secondary seal **120**. A plurality of radially spaced-apart circumferentially-extending strips **195** placed in registry above and beneath the fixture **190** extend outwardly beyond the slots **192** and the legs **193** of the fixture **190**, each of the strips **195** overlying a portion of the adjacent sections **125** spaced from the radially extending end thereof. Suitable fasteners **196** extend through the two strips **195** near the ends thereof to maintain the adjacent sections **125** with the radial edges thereof respectively in the slots **192** of the body portion **191** and fully seated therein. Sealant material **197**, which may be of the same character as the sealant material **157** and **158** previously discussed, may be positioned within each of the slots **192** to ensure the gas tight nature of the secondary seal **120**.

FIG. **7** illustrates a radial fixture **200** which includes a body portion **201** which may be made from the same elastomeric material as the sections **125** forming the secondary seal **120**, the body portion **201** having outwardly extending spaced apart leg portions **203** each defining an oppositely extending slot **202**. The fixture **200** is further provided with coverings **204** which may be of the same synthetic organic resin as the covering **127** for the secondary seal **120**, the covering being a suitable weather-resistant material. Operation of the fixture **200** is the same as the previously discussed fixture **190** with the exception that the slots **202** are so dimensioned as to frictionally receive and retain therein the associated radially extending edges of adjacent sections **125**, whereby fasteners are unnecessary.

Fixture **210** in FIG. **8** is comprised of a body portion **211** which may be made of the same elastomeric material as the body portion **126** of the secondary seal **120** and has outwardly extending legs **213** each defining an appropriate oppositely extending slot **212** dimensioned frictionally to receive and retain therein the radially extending edge of the adjacent section **125**. The fixture **210** includes a plurality of radially spaced apart strips **215** positioned in registry on opposite sides of the body portion **211**, the strips **215** being provided with appropriate fasteners **216** extending therethrough and through the associated one of the adjacent sections **125**. The fixture **210** is similar to the fixture **190** with the exception of the sealant material which is not present in the fixture **210**.

Referring now to FIGS. **12** and **13** of the drawings, there is illustrated an alternative embodiment of the present invention which is similar to that disclosed in FIGS. **1**, **2** and **9**, but which additionally includes a plurality of external support springs (one shown), generally designated by the numeral **250**, for providing additional support for the secondary seal **120**. Preferably, the external support springs **250** are equidistantly spaced around the secondary seal **120**. with each external support spring **250** being disposed substantially midway between adjacent ones of the anti-sag supports **150**.

Each of the support springs **250** is formed of a relatively thin, substantially flat rectangular strip of metal bent at one end thereof to form an attachment end **251**, and bent at the other end thereof to form a curved distal end **252** provided with a hook-like lip **253** at the tip thereof. In assembly, the support spring **250** overlies the secondary seal **120**, with the attachment end **251** thereof overlying the attachment end **129** of the secondary seal **120** beneath the associated clamp bar **145**. Preferably, a sealant material **254** is disposed between the attachment end **251** of the support spring **250** and the attachment end **129** of the secondary seal **120**. The entire assembly being firmly clamped in place by the associated wedges **140**, as described above.

There is preferably also provided an elongated metallic ground strap **255**, one end of which is disposed between the secondary seal **120** and the external support spring **250** adjacent to the distal end **252** thereof. The ground strap **255** extends radially outwardly along the top of the secondary seal **120** to the peripheral edge thereof, around the edge and back radially inwardly along the underside of the secondary seal **120**, the overlapping ends of the ground strap **255** being fixedly secured to the support spring **250** and the secondary seal **120** by a bolt **256** and associated nut **257**. It will be appreciated that the ground strap **255** is disposed in electrical contact with the tank shell **101** for providing a grounding connection thereto.

Referring to FIG. **14** of the drawings, there is illustrated an alternative means of attachment of the external support springs **250** to the floating roof **105** by means of the threaded fasteners **170**, in the same manner as was described above in connection with FIG. **11**. Sealant material **254** is disposed between the attachment portion **129** of the secondary seal **120** and the attachment portion **251** of the support spring **250** in this attachment arrangement also.

In general, the important features of the present invention are the gas tight nature of the secondary seal **120**. This is accomplished by the sealant between adjacent members at the floating roof **105**, by the gas-tight joinder of abutting edges of adjacent sections **125**, by the tapered and rounded end **131** of the outer or free end of the seal **120** which provides a wiper resiliently positioned against the inner surface **102** of the tank shell **101** and continually urged against said surface by the effective length of the seal **120** and the external support springs **250**. The tapered and rounded edge **131** conforms to any tank shell irregularities, thereby eliminating gaps from which vapors from the lading may escape. The secondary seal **120** with the tapered and rounded edge **131** thereof acts as a weather shield protecting the primary seal **115** from the environment, thereby preventing rain and other airborne debris from contacting the primary seal **115** and damaging same.

The secondary seal **120** may be made of a Buna-N-vinyl elastomer or similar synthetic organic resin having the requisite chemical resistance and preferably a durometer hardness in the range of between about 55 and 65. The reinforcing or covering **127** is preferably a nylon or a polyester cloth. The sealants **157** and **158** at the inner attachment end of the secondary seal **120** as well as the sealant **197** in the fixture **190** may be any suitable air curing adhesive or sealant. The same sealant may be used with the attachment means **170**, which are self-tapping bolts, to ensure the gas tight nature of the connection between the secondary seal **120** and the floating roof or pontoon **105**.

It is to be understood that the constructions illustrated in FIGS. **3** through **8** and FIGS. **10** through **14** of the drawings possess all the fundamental desirable characteristics and properties illustrated and described above with respect to FIGS. **1**, **2** and **9** of the drawings.

While there have been described what at present are considered to be the preferred embodiments of the invention, it will be understood that various modifications and alterations may be made therein, and it is intended to cover in the claims appended hereto all such modifications and alterations as fall within the true scope of the present invention.

What is claimed is:

1. A floating roof storage tank comprising an upstanding cylindrical tank shell for containing a quantity of liquid to be stored, a floating roof within said tank shell adapted to float on the surface of the liquid within said tank shell, first sealing means extending between said floating roof and said tank shell and closing the space therebetween to provide a primary seal therebetween, a second sealing member secured to said floating roof and extending therebeyond and lying in sealing engagement with the inner surface of said tank shell to form a secondary seal between said floating roof and said tank shell, clamp means on said floating roof circumferentially spaced therearound for securing said second sealing member to said floating roof, said clamp means including removable wedges for wedging said second sealing member toward said floating roof, a sealant between said floating roof and said second sealing member providing a gas tight seal therebetween, and a plurality of fusible members in said second sealing member circumferentially spaced thereabout.

2. A floating roof storage tank comprising an upstanding cylindrical tank shell for containing a quantity of liquid to be stored, a floating roof within said tank shell adapted to float on the surface of the liquid within said tank shell, first sealing means extending between said floating roof and said tank shell and closing the space therebetween to provide a primary seal therebetween, an annular second sealing means secured to said floating roof and extending radially outwardly therefrom and lying in sealing engagement with the inner surface of said tank shell, said second sealing means including a plurality of arcuate sections with adjacent ones thereof having the free radial edges thereof abutting, bridging means including radially spaced-apart strips bridging said abutting radially extending edges and maintaining same in abutting relationship and fasteners extending through said strips and said adjacent arcuate sections for sealingly interconnecting same to form an annular secondary seal between said floating roof and said tank shell, and a sealant providing a gas tight seal between said annular secondary seal and said floating roof.

3. A floating roof storage tank comprising an upstanding cylindrical tank shell for containing a quantity of liquid to be stored, a floating roof within said tank shell adapted to float on the surface of the liquid within said tank shell, first sealing means extending between said floating roof and said tank shell and closing the space therebetween to provide a primary seal therebetween, an annular second sealing means secured to said floating roof and extending radially outwardly therefrom and lying in sealing engagement with the inner surface of said tank shell, said second sealing means including a plurality of arcuate sections, a fixture having oppositely extending slots dimensioned to receive the

free radially extending edges of adjacent sections for sealingly interconnecting adjacent arcuate sections to form an annular secondary seal between said floating roof and said tank shell, said fixture having plate means overlying adjacent sections and means maintaining said fixture and said sections and said plate means in fixed relation, and a sealant providing a gas tight seal between said annular secondary seal and said floating roof.

4. A floating roof storage tank comprising an upstanding cylindrical tank shell for containing a quantity of liquid to be stored, a floating roof within said tank shell adapted to float on the surface of the liquid within said tank shell, first sealing means extending between said floating roof and said tank shell and closing the space therebetween to provide a primary seal therebetween, a second sealing member secured to said floating roof extending therebeyond and lying in sealing engagement with the inner surface of said tank shell to form a secondary seal between said floating roof and said tank shell, fusible means in said second sealing member permitting access to the annular space between said primary seal and said secondary seal, and a sealant providing a gas tight seal between said flexible secondary seal means and said floating roof.

5. The floating roof storage tank of claim 4, wherein said fusible means is low melting point polyethylene.

6. The floating roof storage tank of claim 4, wherein said fusible means includes a circular frame in said second sealing member and a fusible disc mounted on said frame and secured thereto.

7. The floating roof storage tank of claim 4, wherein said second sealing member includes a plurality of arcuate sections, and means sealingly interconnecting adjacent arcuate sections to form an annular secondary seal between said floating roof and said tank shell.

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